CLAIMS

What Is Claimed Is:

1. A method for positioning a tunneling tip at a spacing of one nanometer from a conducting surface comprising the steps of:

depositing a quantity of fullerene C_{60} on the conducting surface;

removing all but a monolayer film of fullerene C_{60} on the conducting surface;

applying an electrical bias to the tunneling tip;

moving the tunneling tip toward the conducting surface with the fullerene C_{60} film between the tunneling tip and the conducting surface;

monitoring for conductance between the tunneling tip and the fullerene C_{60} film; and

fixing the position of the tunneling tip with respect to the conducting surface when a said monitoring indicates that the tunneling tip is in contact with the fullerene C_{60} film.

2. A removable packaging method for establishing a one nanometer spacing between electrically conducting components comprising the steps of:

depositing a monolayer of C_{60} fullerene on a first fixed conductive surface;

moving a second conductive surface with an electrical bias adjacent to the first conductive surface at a location where current is transferred to the monolayer of C_{60} fullerene;

breaking down the fullerene C_{60} into carbonaceous byproducts;

introducing a gas selected to react with the carbonaceous byproducts to form a stable molecular gas; and

providing a sacrificial surface to selectively adsorb the stable molecular gas.

3. A method for inhibiting contact between a tunneling tip and a conducting substrate comprising the steps of:

depositing a monolayer of fullerene C_{60} on the conducting substrate;

providing the tunneling tip with an electrical bias;

moving the tunneling tip to a position adjacent the conducting substrate and fixing the tunneling tip position with respect to the conducting substrate when an electrical current is detected in the fullerene C_{60} monolayer due to the presence of the tunneling tip;

energizing the monolayer of fullerene C_{60} to breakup the monolayer

into carbonous byproducts; and

removing the carbonous byproducts, leaving the tunneling tip fixed at said fixed position.

4. A method for separating an electron-donating tunneling surface from an electron-receiving surface at a distance of on nanometer comprising the steps of:

establishing a monolayer of fullerene on the electron-receiving surface, where said fullerene has a monolayer thickness of one nanometer;

providing an electrical bias on the electron-donating tunneling surface;

bringing the electron-donating tunneling surface into contact with the monolayer of fullerene on the electron-receiving surface; and

establishing an electrical current between the electron-donating tunneling surface and the electron-receiving surface, said electrical current communicating across the monolayer of fullerene.

5. A method for manufacturing a MEMS device with a protective coating comprising the steps of:

depositing via sublimation a fullerene layer onto a gold surface of a conducting substrate;

providing an electrical bias on a gold-plated tunneling tip;

moving the tunneling tip towards the conducting substrate, and monitoring the

conductivity in the fullerene layer;

fixing the position of the tunneling tip when the monitoring of the conductivity in the fullerene layer indicates that the tunneling tip is in contact with the fullerene layer;

applying thermal energy to the fullerene layer after the tunneling tip position has been fixed to break up the fullerene layer into carbon byproducts;

introducing a gas to react with the carbon byproducts to form a carbon based gas; and

adsorbing the carbon based gas onto a prefabricated sacrificial surface leaving a region adjacent the tunneling tip free of fullerene and fullerene byproducts.

6. A carbon based protective padding for a MEMS device, the carbon based protective padding further adapted to accurately and reliably establish a one nanometer spacing between a conducting surface on the MEMS device and a tunneling tip, the carbon based protective padding comprising a film of fullerene C_{60} having a thickness of one molecule, said film located at the conducting surface between the tunneling tip and the conducting surface.